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An

Dated March 1828

Inaugural Essay

on Dentition and Cholera Infantum.

For

the Degree of Doctor of Medicine

in the University of Pennsylvania.

by John A. Murchison.

of Georgia.

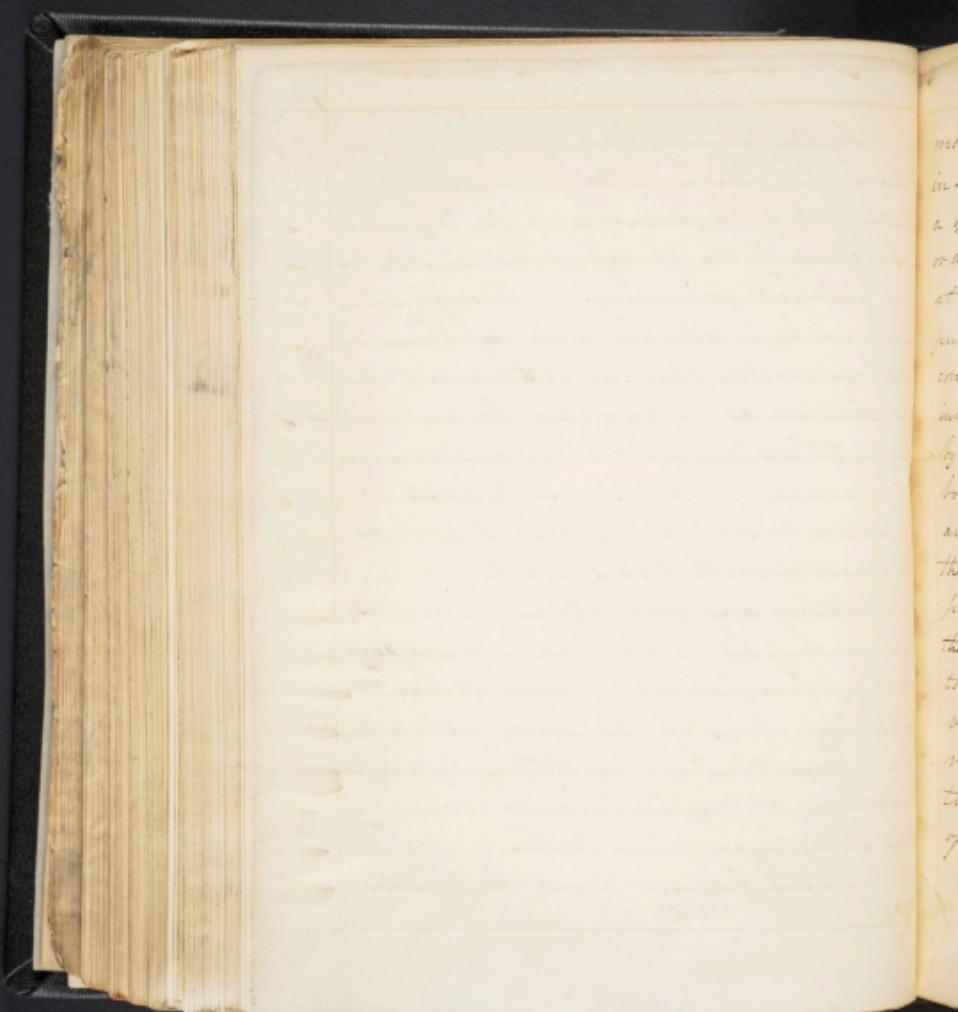
Philadelphia, Feb<sup>r</sup> 3<sup>rd</sup> 1828.



In the following Epay I propose to offer  
some observations on the formation of the  
teeth, with a few remarks on the influence  
exercised by the process of dentition, on  
the animal economy. Though this,  
and perhaps already well explained by  
various writers, the subject may not be  
considered as ill adapted for an inau-  
gural thesis, inasmuch as, considerable  
differences of opinion still exist in  
relation to several important points  
connected with this subject.

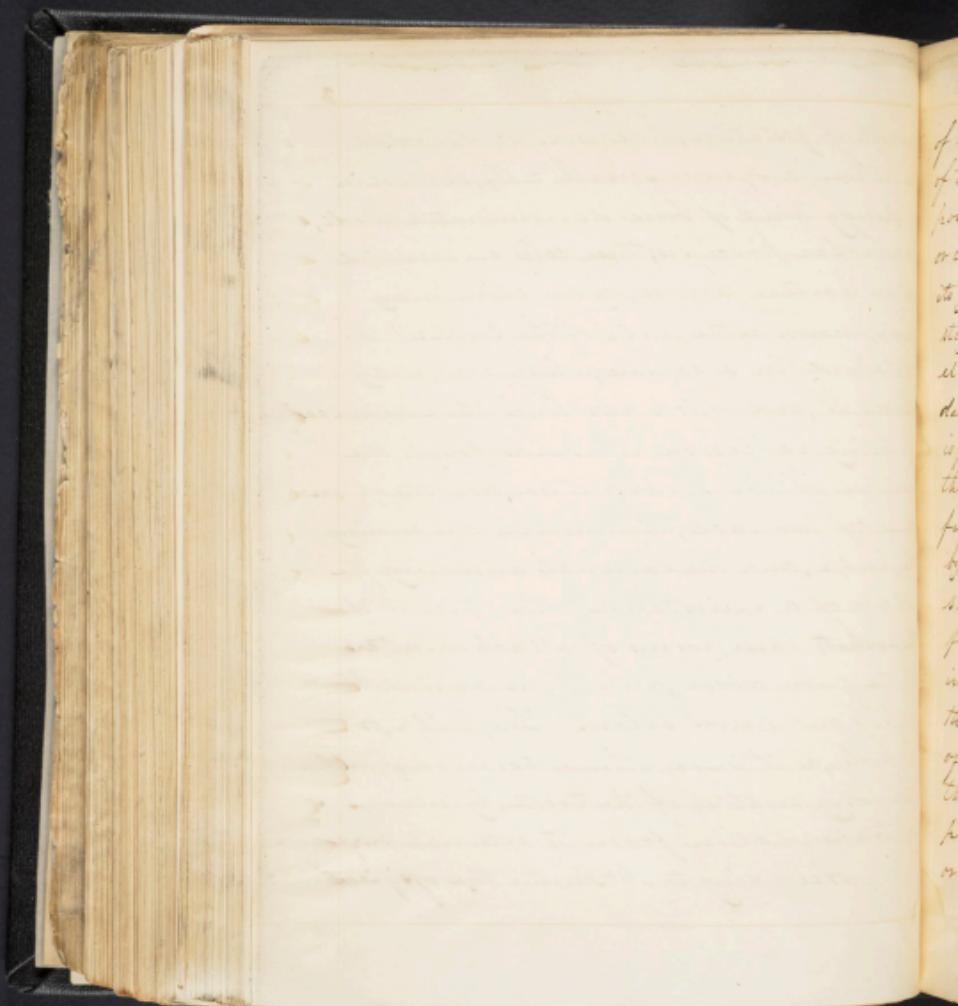
Omitting any preliminary remarks,  
which might be deemed unnecessary  
in this place, I shall proceed at once to  
state my views of the mode of their develop-  
ment and thus arrive by <sup>an</sup> analytical  
method, at my inferences concerning  
the structure of the teeth.

In the foetus, at about the fourth

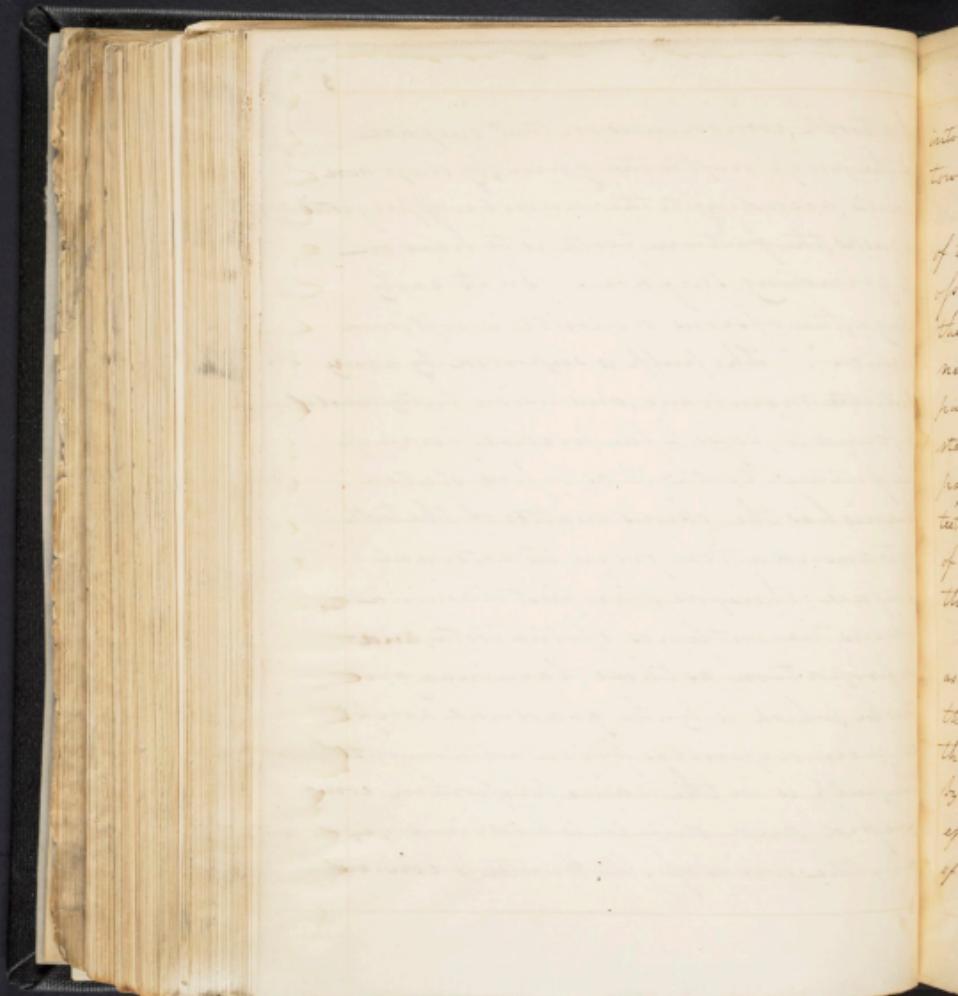


month of gestation, there may be discovered in either jaw, some small cells, seated in a spongy kind of bone denominated alveoli, or alveolar process; these cells are occupied at an earlier period, by an elementary pulp, known as the pulp of the tooth; it is contained in a capsule, which completely invests it, and which also lines the alveolar cavity; by being reflected upwards from the bottom of the socket, it has now the appearance of two sacks, the internal one covering the pulp, and the external answering the place of a periosteum to the interior of the socket; their points of attachment are to the gum above, and to the dental fibers, vessels and nerves below. The pulp, or vesicle, as it is sometimes termed, furnishes the living matter of the tooth, by means of transudation from its external surface.

According to Mr Hunter the ossification



of a tooth, commences on that surface of the pulp next to the gum, by one, or more points, according to the number of projections, or cusps, the future tooth is to have on its grinding surface. In its early stage, the osseous deposite is soft, and elastic. The pulp is supported by a very delicate membrane, and when fully developed, is found to possess the precise form of the future tooth; it as before stated, furnishes the osseous matter of the tooth by transudation from its external surface; therefore, the first lamina forms the outlines of the tooth, and in proportion as these laminae grow thicker, which is by the gradual accretion of new depositories from within outwards, the pulp is in the same proportion compressed, and diminished in size, or in the words of Mr Hunter, is converted



into a fang by its elongation towards  
towards the bottom of the socket.

The completion of the roots  
of the teeth is a subsequent process of  
ossification; their number is always  
the same with the number of distinct  
nerves and blood-vessels which go to the  
pulp of the teeth. The roots, in their finished  
state, are pointed, with a small canal  
passing through them to the body of the  
tooth, in which is lodged the remains  
of each vesicle, being much smaller at  
that time, than while in the fetal tooth.

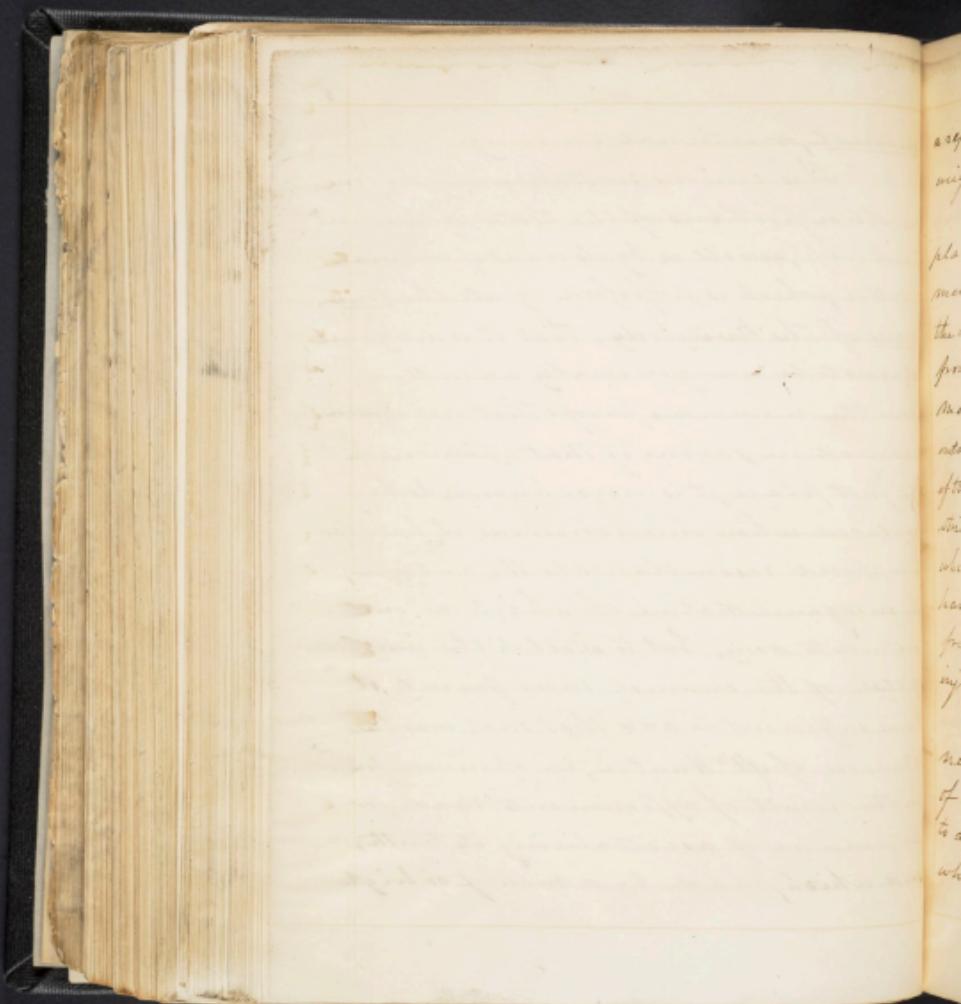
As I have now stated as nearly  
as I could, all that suggested itself respecting  
the long matter of the teeth, together with  
their mode of development, and the apparatus  
by which they are produced, it next becomes  
essential, in order to finish the description  
of those organs, to give some account of their

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enamel, or external covering.

This curious substance differs from the other portions of the tooth by its superior hardness, as well as by its want of animal matter, which is supposed by all the true bones of the living body; that it is inorganic, appears to be now generally admitted, from the numerous proofs that have been adduced in favour of that opinion: in the first place, it is never known to be replaced when once removed; it has also a supposed resemblance to the cuticle, the inorganic nature of which no one pretends to deny; but to establish the inorganic nature of the enamel more firmly, it seems sufficient to add that such was the opinion of Mr Hunter, an opinion founded on the result of experiments made for the purpose of ascertaining its truth, and which, made by a man of so high



a reputation ought to have the greatest weight.

I shall have occasion in the next place to advert to the outer one of the two membranes already represented as lining the alveolar cavity, and forming a reflexion from the bottom of the socket, the internal membrane that invests the pulp. This outside membrane secretes the enamel of the tooth, and deposits it in perpendicular striae, of about half a line in thickness, of which arrangement, together with its extreme hardness, it is enabled to withstand the friction to which the teeth are exposed, without injury.

The crown of the tooth, as far as the neck, is the only part that has a covering of enamel, a circumstance, difficult to account for, since the membrane which furnishes this substance, goes



down as far as the tooth does.

To account for the fact, that the enamel is not reproduced, is easy, since, it is only necessary to know, that, that portion of the membrane which covered the crown of the tooth, and supplied it with a covering of this substance, is annihilated as soon as the tooth makes its way through the gum.

The teeth, formed upon the membranes just named, are buried beneath the gum. On the alveolar surface of each infant jaw, at birth, small cells are discernible, in which, the rudiments of all the teeth, both deciduous and permanent, are ready formed; at an earlier period, a longitudinal groove exists, in place of them, in which, these cells are afterwards formed by the deposition of bone matter in transverse ridges, dividing

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it at first into superficial depressions, which appear to be influenced in their size by the growth of the teeth. The roots of the deciduous teeth, at the time of birth, are not completed, but, are somewhat elongated towards the bottom of the sockets or alveoli.

At about the expiration of six months after birth, the tooth is more fully developed, and begins, by a certain process, to make its way through the gum; the roots elongating themselves, cause the body of the tooth to rise and press on the portion of the gum and membranes immediately above; in this manner, the absorbents are excited to remove the parts just mentioned, and the entire expulsive of the body of the tooth is effected without further interruption.

The teeth which are first cut, are the two lower middle incisors; their appearance through the gum is announced, at first, by pain and

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turnefaction in the part, succeeded by their eruption, which takes place between the fourth and eighth month after birth. The next which are cut, are the upper incisors, and the two lower, on ~~the~~ side of those already cut. The first Molar, on each side, are next in succession, and are followed by the cuspids or canines teeth; and, at the end of the second year, the last molar appears, which completes what is termed the first dentition; this furnishes the child with eight incisor, four canine, and eight molar, making in all, twenty teeth which is its complement.

The shedding of the deciduous teeth, commences about the sixth or seventh year, though in a way evidently not well understood, as of course from the diversity of opinion which exists as to the nature of the process; some supposing it to depend on pressure exerted by the permanent teeth on the roots of the deciduous ones, and in that way causing the absorption of their fangs; while others

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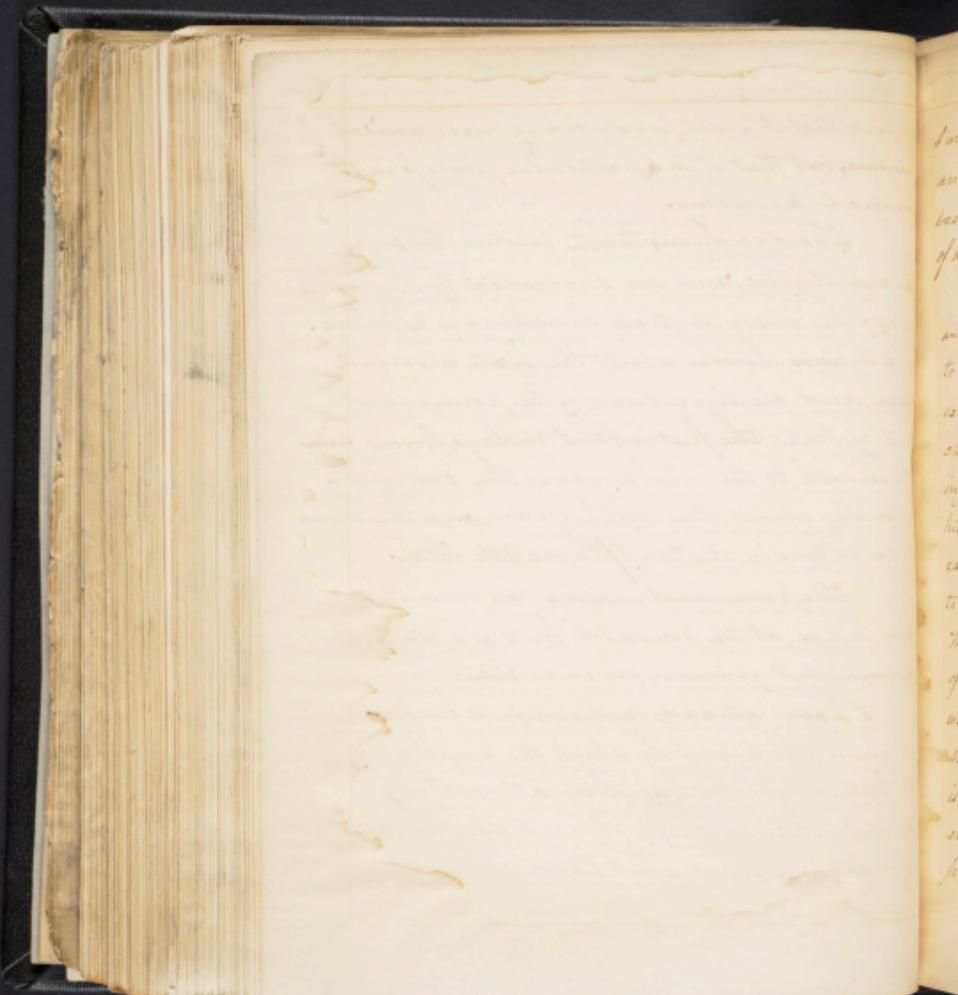
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content that it is not produced by mechanical pressure, but that it is a particular process in the animal economy.

The deciduous teeth become loose, as already stated, and are succeeded by the permanent; the order of their shedding is as follows. The incisors loosen about the sixth or seventh year, and are succeeded by the permanent cutting teeth; the first infant molar, loosens from the seventh, to the ninth year; the cuspidate gives way about the tenth year, and the second molar follows in the twelfth, or a little later.

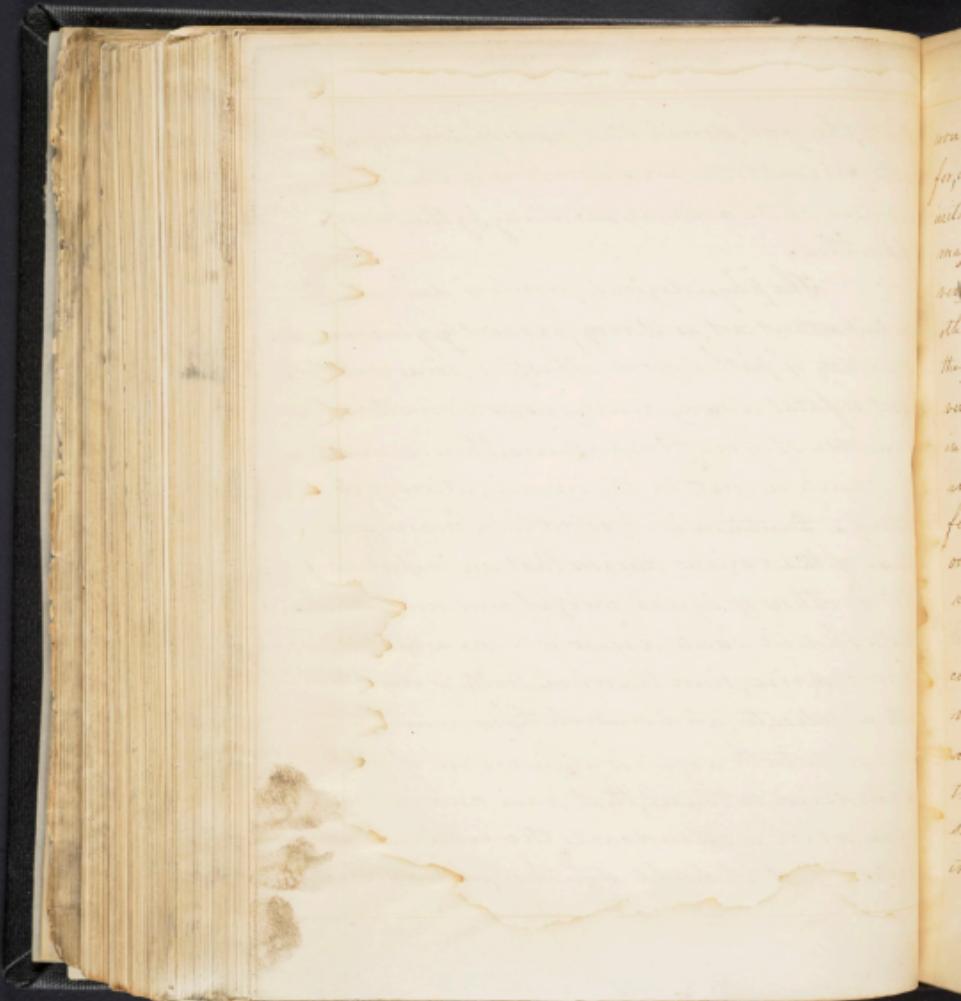
The permanent incisors are formed, in their bodies, at the period of birth, as is also the permanent grinder, on each side.

I have already noticed, in a cursory manner, the process by which the eruption of the teeth is effected, and in attempting to describe it more fully, I fear I should do little more than repeat what I have already said;



I will, therefore, dismiss that part of my subject, and proceed to the consideration of the influence exercised on the animal economy, by the process of dentition.

The physiological process of dentition is an important act, as it very frequently gives rise to a variety of pathological affections, some of which exert so fatal a sway among us, as to give it a character of great importance, thereby demanding much interest in the investigation of its history. Dentition is objected to by many, as a cause of the various diseases that are imputed to it. By others of equal weight and responsibility, that it should excite disease, is to me a matter of no surprise, since the whole tooth is invested with a delicate, and sensible tissue, which, as soon as the tooth acquires an increase of size, is rendered so tense, that pain and inflammation ensue, which is extended to the contiguous parts. That it should stop there, will excuse



would indeed be a matter of some astonishment; for, it has been satisfactorily demonstrated, that, irritation arising from a merely local disorder, may, through the brain and nervous system, produce very great derangements of the digestive & other organs. In fact, that, in infants, the process of dentition is often the source of very considerable irritation, which, seated in the gums and jaws, readily radiates as above said, to the digestive organs, producing fever, imperfect digestion, and cholera; on the last of which, I will now offer a few remarks.

Cholera Infantum mostly seizes children between their fifth, and twentieth months; they are also more liable to the disease during summer than at any other season of the year, and in cities, or other crowded situations, more than in the country, though it is by no means confined exclusively to

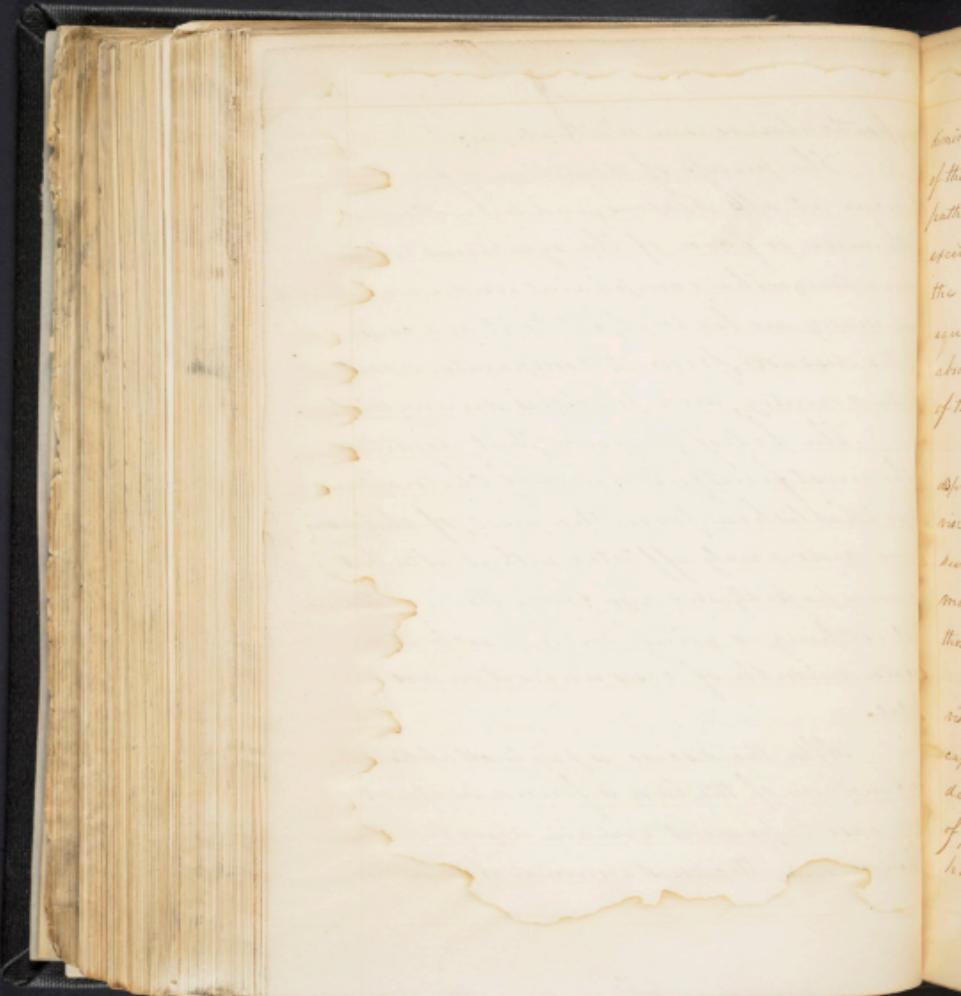
One of the most fruitful sources of

any particular season or situation.

The process of dentition is known to occur at all seasons, and to be attended with more or fewer of the symptoms which characterize the complaint under consideration, and many are led to object to it as a cause of this disease, from its comparative rarity in the country, and in cities during winter.

The belief, however, that dentition is the most fruitful source of Cholera, seems to be established from the fact, of children being more rarely afflicted with it after that period, and also from the circumstance, that teething is going on in vastly the greater number of cases where it proves fatal.

After the disease is fairly established, the function of the liver is found in almost every case to present certain morbid phenomena, the most common of which is



diminished secretion, owing probably to congestion of that viscus, this is accounted for by a general pathological principle, which is, that, increased excitement cannot be long continued in the human body, without destroying the equilibrium of the circulation, which is absolutely necessary to the healthy condition of the human frame.

The liver in a young child, from its disproportion, in point of size, to the other viscera, and the sluggish action of its vessels, seems to be rendered more susceptible of morbid arrangements, and particularly those of a congestive nature, than in an adult.

These determinations to the different viscera produce a disordered state of the general capillary circulation, which induces at once, derangement of the important function of perspiration; the skin becomes dry and husky, and no longer excretes with regularity.

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the offices assigned to it; the consequence is an increased secretion of fluids in the intestinal canal, which becomes disordered from the vicious nature of those matters.

In *Cholera Infantum*, free discharge of bilious matter, either by vomiting or stool, are of rare occurrence; hence, the inference that, too great a derangement of blood through portal system has taken place, which deranges the liver for the performance of its healthy functions.

The brain, in congestive apoplexy, where the intellectual functions are much interrupted or entirely suspended, may be cited as analogous in its nature to this state of the liver. The lungs, in *Pneumonia Notata*, bear very much the same character as in this case, there are effusions into the lungs which prevent a decarbonization of the blood.

*Cholera* is perhaps a term the least expressive of the facts that occur in this disease.

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that could be chosen, as there is a remarkable absence of bilious matter in the vomitings, or purging, which forms perhaps the most prominent feature in its character.

That there are sometimes discharges of bilious matter is not to be doubted, and, particularly, in those cases which do not terminate fatally in a very short time; if the stools are not decidedly bilious, spots of a greenish appearance may be discovered on a mucous serous base, denoting a very diminutive bilious secretion. But, in a majority of cases, particularly, acute ones, there is an entire want of bilious matter. An attempt to prove that there is a disorder of this kind in the secretory function of the liver, conceive entirely unconvincing, as the fact appears to be admitted by everyone.

An offensive odour resembling that of putrid animal matter undergoing putrefaction

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fermentation, is a mark of this disease, and which is always removed when a flow of bile takes place; were arguments at this time necessary to establish the above position, (a diminished biliary secretion) I would offer this, as one almost sufficient in itself to remove every doubt.

If I regard cholera then, as a gastric irritation, connected with congestive disease of the liver, occasioning diminished secretion of bile; frequent vomiting; large and peculiarly offensive stools; great emaciation, pallor, languor, and tendency to fainting, and sinking, I shall, perhaps have sufficiently laid down my views of its early pathology.

In the progress of the disease, the pathological state of the patient is frequently altered, as is exemplified in many of those cases which occur about June, or July, where the patient languishes until the frosts of October or November, before they begin to recover; and not a few

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become victims of the chronic form; and they perish at all periods, from three or four days, to as many months.

Under this protracted form, it is evident that the mucous membrane of the bowels will suffer more or less; there will also be derangement of the portal circulation; the lacteal and lymphatic absorption of the whole abdominal cavity, will experience much derangement as to their functions: the body, will, therefore, be imperfectly nourished, and a state of cachexy or marasmus will be the result.

Dyauteric symptoms are not uncommon as is affirmed by writers on this disease, and it appears particularly when connected with it, that there is a ulcerous condition of the colon and rectum.

I shall now proceed to state, in a few words, the treatment to be pursued.

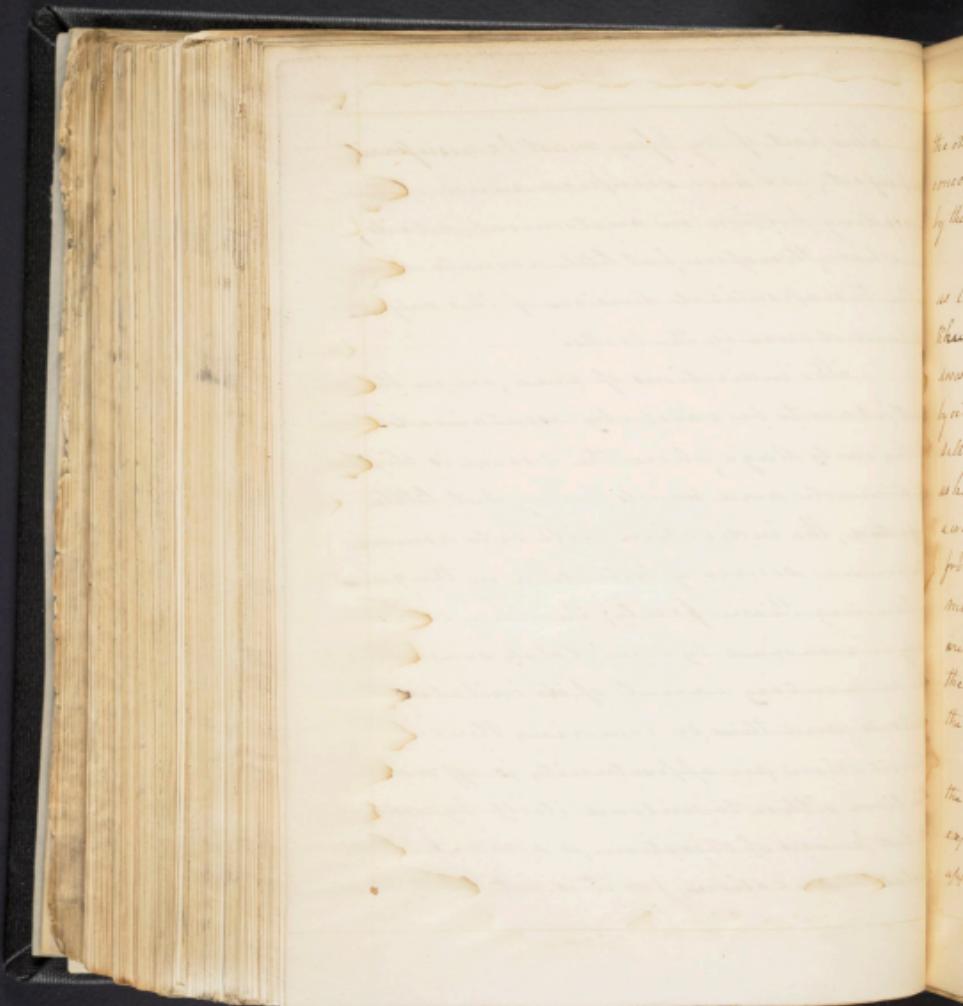
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This part of my Essay must be necessarily imperfect, as I have occupied much of the preceding portion in anatomical details, and have, therefore, but little room to allude to the therapeutical division of this subject, as laid down by the books.

The indications of cure, are, in the first place to be carefully ascertained. In the early stage, where the disease is slight, the stomach and bowels being but little affected, the indication will be to remove the prime source of irritation in the jaws by lancing them freely; the other cause may be removed by completely evacuating the alimentary canal of its irritating contents, and thus, by removing the cause of irritation, an opportunity is afforded the liver either to unload itself by reconstituting its lost powers of secretion, or a more healthy portal circulation, for it is not likely, that,



the other vessels of the abdomen than those immediately concerned in the portal circulation, can be affected by the operation of gentle evacuants.

Lancing the gums, and gentle enemas, as Cedar oil, Bleaching mixture, Spiced Rhubarb, Rhubarb and Magnesia, balomel, in small doses, either combined with rhubarb, or followed by oil, are perhaps, the best evacuants. Neutral salts, and hydrogogue medicines, are considered as hurtful, by irritating the bowels in such a way as to keep up too copious a secretion from them. Injections of flax-sea tea, mucilage of slippery elm, starch, &c. &c. &c. &c. are of much value, as they lessen very much, the irritation and at the same time keep the bowels soluble.

In cases of a severe nature, where the vomiting is obstinate, much may be expected from mustard or blistering plasters, applied to the epigastrium, also fomentations,

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hot brandy and laudanum, and other  
similar applications, are of great importance.

Small doses of calomel, as the fourth, the  
sixth, or the eighth of a grain, combined  
with a little gum arabic, may be given  
every hour; and to allay the irritability of  
the stomach, which is of much importance,  
lime water and milk, or soda water, may  
be given.

I should have mentioned that  
an injection of laudanum and starch,  
would have a more decided effect in  
allaying that condition of the stomach  
just mentioned, than almost any other  
remedy. The diet of the child, if a  
nursling should consist of its mother's milk  
in preference to any thing else.

The methods of combating a scrofulous  
attack have now been laid down. The  
after treatment consists in attention to

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the clothing and diet of the patient, and the  
use of some mild tonic, as the Extract of  
Gentian, or Sulph. of Quinine in Syrup.

COUNTRY air is of the greatest importance;  
and when practicable, the patient should  
not be denied the sun, and in some cases,  
the almost only resource for recovery; when  
this cannot be obtained, as a substitute, exercise  
in a carriage in fine weather; or sailing may  
be had recourse to; something of the kind  
is considered of vital importance for the  
restoration of health and strength.

I shall here close my account of  
Cholera, because, when the disease becomes  
chronic, it partakes more of the nature of  
Marasmus, for an account of which, I refer  
to the excellent work of Dr. Agar.

Hoping that the want of any considerable  
personal experience, may serve as my excuse  
for the absence of minute details.

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the omission of probably some important  
indications as to the character or treatment,  
of the disease, I beg leave to offer the above sketch, rude  
and imperfect as it may be, to the consideration of  
my respected teachers.

A. S. Agius Hart

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